WHAT IS CLAIMED IS:

1. A method of computing phase difference between a measured signal and a reference signal, the method comprising:

measuring a first cycle of the measured signal to arrive at a first denominator;

measuring a first cycle of the reference signal to arrive at a second denominator;

calculating a time after the first cycle of the measured signal and a subsequent pulse of a reference clock signal to arrive at a first numerator;

calculating a time after the first cycle of the reference signal and the subsequent pulse of the reference clock signal to arrive at a second numerator;

dividing the first numerator by the first denominator to arrive at a first quotient;

dividing the second numerator by the second denominator to arrive at a second quotient; and

deriving a difference between the first and second quotients to arrive at a first position value, wherein the position value translates to a first phase difference.

2. The method of computing phase difference between a measured signal and a reference signal of claim 1, the method further comprising:

computing a derivative of the first quotient over time to arrive at a first frequency value.

3. The method of computing phase difference between a measured signal and a reference signal of claim 2, the method further comprising:

correlating the first phase difference to the first frequency value in a lookup table.

4. The method of computing phase difference between a measured signal and a reference signal of claim 1, the method further comprising:

calculating a time after the first cycle of the measured signal and a pulse following the subsequent pulse of a reference clock signal to arrive at a third numerator;

calculating a time after the first cycle of the reference signal and the pulse following the subsequent pulse of the reference clock signal to arrive at a fourth numerator;

dividing the third numerator by the first denominator to arrive at a third quotient;

dividing the fourth numerator by the second denominator to arrive at a fourth quotient; and

deriving a difference between the third and fourth quotients to arrive at a second position value, wherein the second position value translates to a second phase difference.

5. The method of computing phase difference between a measured signal and a reference signal of claim 4, the method further comprising:

computing a derivative of the third quotient over time to arrive at a second frequency value.

6. The method of computing phase difference between a measured signal and a reference signal of claim 5, the method further comprising:

correlating the second phase difference to the second frequency value in the lookup table.

7. A method of computing time difference between a measured signal and a reference signal, the method comprising:

measuring a first cycle of the measured signal to arrive at a first denominator;

calculating a time after the first cycle of the measured signal and a subsequent pulse of a reference clock signal to arrive at a first numerator;

calculating a time after the first cycle of the reference signal and the subsequent pulse of the reference clock signal to arrive at a second numerator; and

deriving a difference between the first and second numerators to arrive at a first time difference value.

8. The method of computing time difference between a measured signal and a reference signal of claim 7, the method further comprising:

dividing the first numerator by the first denominator to arrive at a first quotient; and

computing a derivative of the first quotient over time to arrive at a first frequency value.

9. The method of computing time difference between a measured signal and a reference signal of claim 8, the method further comprising:

correlating the first time difference value to the first frequency value in a lookup table.

10. A method of computing phase difference between a measured signal and a reference signal, the method comprising:

receiving the measured signal from a first receiver wherein the measured signal provides a pulse on each cycle;

generating a reference clock signal and a measurement clock signal;

receiving the reference signal from a second receiver wherein the reference signal provides a pulse on each cycle;

calculating a measurement denominator value based on a first pulse and a succeeding second pulse of the measured signal wherein the value is calculated against the measurement clock signal;

calculating a measurement numerator value based on the second pulse of the measured signal and a next succeeding pulse of the reference clock signal;

deriving a measurement quotient value by dividing the measurement numerator value by the measurement denominator value;

calculating a reference denominator value based on a first pulse and a succeeding second pulse of the reference signal wherein the value is calculated against the measurement clock signal;

calculating a reference numerator value based on the second pulse of the reference signal and a next succeeding pulse of the reference clock signal;

deriving a reference quotient value by dividing the reference numerator value by the reference denominator value; and

calculating a difference between the measurement quotient value and the reference quotient value to arrive at a position value, wherein the position value relates a phase difference.

11. The method of computing phase difference between a measured signal and a reference signal of claim 10 further comprising:

deriving a derivative of the measurement quotient as a function of phase over time and determining an operating frequency; and

relating the operating frequency to the phase difference.

12. The method of computing phase difference between a measured signal and a reference signal of claim 11 further comprising:

storing the operating frequency and the phase difference in a lookup table.

13. A method of computing time difference between a measured signal and a reference signal, the method comprising:

receiving the measured signal from a first receiver wherein the measured signal provides a pulse on each cycle;

generating a reference clock signal and a measurement clock signal;

receiving the reference signal from a second receiver wherein the reference signal provides a pulse on each cycle;

calculating a measurement denominator value based on a first pulse and a succeeding second pulse of the measured signal wherein the value is calculated against the measurement clock signal;

calculating a measurement numerator value based on the second pulse of the measured signal and a next succeeding pulse of the reference clock signal;

deriving a measurement quotient value by dividing the measurement numerator value by the measurement denominator value;

calculating a reference numerator value based on the second pulse of the reference signal and a next succeeding pulse of the reference clock signal;

calculating a difference between the measurement numerator value and the reference numerator value to arrive at a time difference value.

14. The method of computing time difference between a measured signal and a reference signal of claim 13 further comprising:

deriving a derivative of the measurement quotient as a function of phase over time and determining an operating frequency; and

relating the operating frequency to the time difference value.

15. The method of computing time difference between a measured signal and a reference signal of claim 14 further comprising:

storing the operating frequency and the time difference in a lookup table.

16. An optical measurement system comprised of:

an optical receiver outputting a measured signal having a clock cycle;

a reference receiver outputting a reference signal having a clock cycle;

a system clock signal; and

a measurement clock signal, wherein

the clock cycle of the measured signal and the clock cycle reference are calculated against the measurement clock signal,

the beginning of the second cycle of the measured signal is timed to a next subsequent pulse of the system clock signal and divided by the clock cycle of the measured signal to arrive at a first vector phase value;

the beginning of the second cycle of the reference signal is timed to the next subsequent pulse of the system clock signal and divided by the clock cycle of the reference signal to arrive at a second vector phase value; and

the difference between the first and the second vector phase values is calculated to arrive at a first position value.

17. The optical measurement system of claim 16 further comprised of:

a frequency converter, wherein the frequency converter converts the first vector phase to a first frequency value.

18. The optical measurement system of claim 17 further comprised of: a lookup table wherein the first position value is correlated to the first frequency value.

19. The optical measurement system of claim 18 further comprised of: a memory in the optical receiver wherein the lookup table resides.

20. The optical measurement system of claim 16 wherein the beginning of the second cycle of the measured signal is timed to a subsequent pulse of the next pulse of the system clock signal and divided by the clock cycle of the measured signal to arrive at a third vector phase value; the beginning of the second cycle of the reference signal is timed to the next subsequent pulse of the next pulse of the system clock signal and divided by the clock cycle of the reference signal to arrive at a fourth vector phase value; and the difference between the third and fourth vector phase values is calculated to arrive at a second position value.

21. The optical measurement system of claim 20 further comprised of: a frequency converter, wherein the frequency converter converts the third vector phase to a second frequency value.

22. The optical measurement system of claim 21 further comprised of: a lookup table, wherein the second position value is correlated to the second frequency value.

23. The optical measurement system of claim 21 further comprised of: a memory in the optical receiver wherein the lookup table resides.

24. An optical measurement system comprised of:
an optical receiver outputting a measured signal having a clock cycle;
a reference receiver outputting a reference signal having a clock cycle;
a system clock signal; and
a measurement clock signal, wherein
the clock cycle of the measured signal and the clock cycle reference are calculated against the measurement clock signal,
the beginning of the second cycle of the measured signal is timed to a next subsequent pulse of the system clock signal to arrive at a first time value and
divided by the clock cycle of the measured signal to arrive at a vector phase value;
the beginning of the second cycle of the reference signal is timed to the next subsequent pulse of the system clock signal to arrive at a second time value; and
the difference between the first and the second time values is calculated to arrive at a time difference value.

25. The optical measurement system of claim 24 further comprised of:
a frequency converter, wherein the frequency converter converts the vector phase to a frequency value.

26. The optical measurement system of claim 25 further comprised of:
a lookup table wherein the time difference value is correlated to the frequency value.

27. The optical measurement system of claim 26 further comprised of:
a memory in the optical receiver wherein the lookup table resides.